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ARTICLE

Milk, rubber, white coats and glass: the history and design of the modern French feeding bottle

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ABSTRACT

Despite its cultural prominence, the history of the feeding bottle is rarely discussed in contemporary research, contrary to popular deliberations focusing on its material attributes. In order to fill the gap, this article wishes to highlight the various attributes of the modern feeding bottle, created in France during the nineteenth century, an era in which modern consumerism coincided with the medicalization of childhood. Using hundreds of feeding bottles, advertisements, pharmaceutical catalogues and manuals for mothers composed by physicians and midwives, the article examines the design and socio-cultural norms surrounding the modern century feeding bottle, while analysing the complex relationship between the object, the users, the manufacturer/designer and the socio-medical environment. Using a multidisciplinary approach combining social history, material culture and design theory, we wish to portray the modern feeding bottle as a mirror of changing socio-cultural norms and conventions, reflecting the rise of the medicalized and sanitized body, governed by science.

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Introduction

In Paul Gauguin's *White Tablecloth, Pension Gloanec* of 1886 (Figure 1), a white ceramic jug decorated with flowers stands out in the middle of the frame, between a carafe of wine and a bowl of cherries. Ever since his arrival in Southern France, Gauguin was fascinated by the primitive allure reminiscent of his childhood in Peru, mirroring Rousseau's perception of the binary opposition between primitive life and European decadence. Yet, his fascination with this jug did not merely stem from his enchantment with Breton naiveté, but rather from its unique function as a feeding bottle (Figure 2), used by the inn keeper, Marie-Henri, a new mother to a young daughter (Cariou 2003). Indeed, a closer analysis of this vessel, manufactured in Quimper, reveals a ceramic body, a

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Figure 1. Paul Gauguin, *The White Tablecloth*, *Pension Gloanec* (*La Nappe blanche, Pension Gloanec*), 1886, oil on canvas, 55 cm × 58.5 cm. Private collection, Japan. From Wikimedia Commons.

Figure 2. Biberon Quimper, 1904, faience, h: 15 cm. © Musée département Breton, Quimper.

slender bottom and a bulkier upper part, which is equipped with a short snout and upper opening. While the bottle is decorated in a typical manner, its function is not aided by the bulky design, neither for baby's hands, nor for a gentle pour into the baby's mouth.

In light of the difficulty of the object's abrupt outright identification, from a design history perspective, we must try to trace the origins of its unique shape and configuration. Was it initially designed for feeding babies or was it 'appropriated' from another function? Is it a vernacular design, unique to French material culture? Was it comfortable to use? Is the use of ceramics important from a design history perspective, or was it simply cheaper than alternative materials? What are the social and historical processes that birthed this simple, yet highly complex designed object? Since in the 1880s, feeding bottles were in common use in France, designed from glass, adorned with rubber easy-to-use nipples, and charts measuring the amount of milk (see, for example, Figures 3 and 4), one wonders why this unusual, seemingly uncomfortable bottle was still being used at the end of the nineteenth century. While seemingly simple in essence, these questions stem from highly significant historical issues, such as the intricate relationship between society and medicine, and between physicians and consumer products; the definition of the family as an economic unit; and the place of the child in the midst of all these socio-historical aspects.

As presented by Rice's research (2010), dedicated to the history of the stethoscope and its use in the medical examination, focusing on medical objects highlights the relation between material culture, history, norms and conventions. In this essay, we wish to underline the various visual attributes of the modern feeding bottle, created in France during the nineteenth century, an era in which modern consumerism coincided with the medicalization of childhood, creating 'a process by which nonmedical problems become defined and treated as medical problems, usually in terms of illness and disorders' (Conrad 2007). Based on various feeding bottles, advertisements, pharmaceutical catalogues and manuals for mothers composed by physicians and midwives, we will examine the design and socio-cultural norms surrounding the bottle from an innovative multidisciplinary approach combining social history, material culture and design theory. In order to decipher the 'commodity situation', i.e. the meaning of an object and its socio-cultural setting and use (Appadurai 1986), four main factors will be addressed: the object (the bottle), the users (primary users – babies, as well as secondary users – parents or caregivers), the manufacturer/designer (caregivers, midwives and doctors) and the socio-medical environment. In addition to the growing medicalization of the bottle industry, we will demonstrate that the modern bottle's design history reveals a shift in focus from the secondary users to the primary users, namely children, who became during the second part of the nineteenth-century key players in consumer culture. Yet, at the same time,

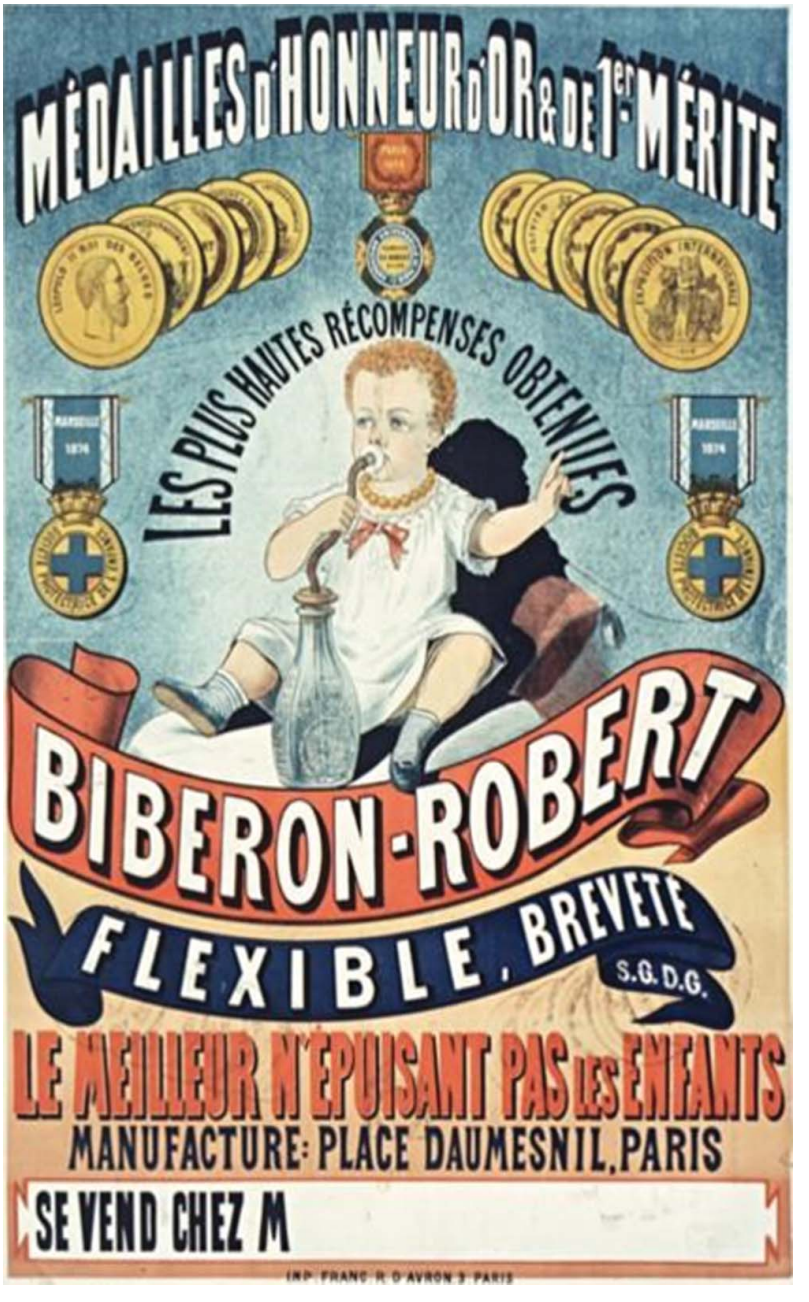

Figure 3. Robert Feeding-bottle, 1882, lithograph, 80 cm × 62 cm. Bibliothèque nationale de France, département Estampes et photographie, Paris. © Bibliothèque nationale de France.

we will show how the medicalization of the feeding bottle also alienated parents from their offspring, as well as from their babies' bodily experience.

By examining the bottle from historical, material and visual perspectives, we will highlight the vast changes that took place from throughout the nineteenth century in the attitude towards childhood, parenthood, intimacy and bodily

Figure 4. Advertisement for a new Feeding Bottle designed by Dr Rougeot, 1887, lithograph, 32 cm ×26 cm. Bibliothèque Nationale de France, département Estampes et photographie, Paris. © Bibliothèque nationale de France.

functions, as reflected in the design of the feeding bottle. Nonetheless, following Bijker's footsteps (1995), we will adopt a contextualized rather than internalist approach. We will assert that feeding bottles' design evolution is not always linear, affecting periods of 'change' vs. 'unchange'.

Quid pro quo design: from baby-feeders to feeding bottles

Until the end of the First World War, three main feeding methods coexisted: maternal breast-feeding, wet-nursing and nourishment based on animal milk. Indeed, in 1780, Maxime de Sarthe-Lenoir, Lieutenant General de Police of Paris, claimed that only a thirtieth of newborn babies are fed their mother's milk, while another thirtieth are fed in their homes by hired nurses (Senior 1983). Conversely, maternal breast-feeding and wet-nursing were particularly common (Martucci 2015), as the use of animal milk prior to Louis Pasteur's discoveries endangered the lives of those babies nourished by it. The use of animal milk stemmed from, among other reasons, the mother's new pregnancy or her death at childbirth, the birth of twins or the inability to pay a wet-nurse, and was, therefore, more common among the lower classes (Fildes 1986; Matthews-

Fig. 5. — Biberons, d'après la collection exposée par le Ministère de l'intérieur. N^os 1 à 5. — Biberon Gallo-Romain. — N° 6. Basque. — N° 7. Breton. — N° 8. Périgord. — N° 9. Ariège. — N° 10. Nevers. — N° 11. Nord. — N° 12. Biberon canard. — N° 13. Biberon sabot.

Figure 5. Feeding Bottles, in E. Flandrin, 'L'Exposition de l'élevage de l'enfance,' *La Nature, Revue des sciences et de leurs applications aux arts et à l'industrie*, 1890, vol. 18, no. 1, p. 325. © Bibliothèque nationale de France.

Grieco and Corsini 1991; Yalom 1998). Since, unlike today, the need for a bottle was not known in advance, the object was not premeditated, but rather found in the household and adapted to this particular need. Lacking a formal manufacturer, it was not a unique feeding bottle, but rather a 'baby-feeder', conceived by the caregivers who used what they found lying around the house. Although the use of bottles in pre-modern times was relatively rare, archaeological finds show that bottles have existed since antiquity (Figure 5, objects 1–5). Resembling clay teapots, featuring a rounded handle and long spout, they were meant to transport the liquid directly into the baby's mouth. These early vessels – reminiscent of the nineteenth-century Quimper bottle painted by Gauguin – apparently served to feed babies when the alternative – maternal milk – was lacking.

In some cases, an object's lengthy life can correlate with its success, as demonstrated by the nail, which has remained unchanged since Roman times (Petroski 2010). In other cases, frequent technological changes leading to a somewhat hectic and ever-changing design evolution, as is the case with cell phones (Julier 2007). In light of the lengthy life of this bottle, preserving its unique features until the end of the nineteenth century, an investigation of its materiality and form can broaden our understanding of the design process,

which we believe is not always manifested via a material process of change and redesign, but in some cases can result from a cognitive articulation of a need and the rapid adjustment of a relevant solution. Indeed, although the ancient 'teapot' bottle resembles the *Oinochoe* – an antique pouring jug, which normally contained wine – we can clearly see a design intervention, since its configuration attests to a premeditated focus on the specific physiological needs of the baby. Antique vessels that were used in the kitchen generally constituted serving dishes intended either for a single user (i.e. *Skyphos*, a drinking bowl) or a group (i.e. *Hydria*, a water pitcher); or displayed storage capacities (i.e. *Krater*, *Stamnos* or *Amphoras* for storing liquids). However, the serving of liquids to children presented caregivers with a new set of challenges, since the required object had to offer both serving and storage abilities.

The deliberate choice to adapt the *Oinochoe* demonstrates what we wish to call *quid pro quo design* ('something for something' in Latin). Although other vessels, such as the short spouted *Lekithos* (oil jar), also possessed both storage and service attributes, the long-spouted *Oinochoe* was preferred due to its suitability for infant feeding. The *quid pro quo design* modus operandi is manifested in the caregiver's 'adaptation' of objects found in the kitchen or pantry, making an exact archaeological identification process virtually impossible. Therefore, we can surmise that various objects, such as cups or spoons, served as baby-feeders, but have not been identified as such by archaeologists. However, the case is different with the 'teapot' feeding vessel, since its shape was preserved nearly unscathed until the end of the nineteenth century (Figures 1 and 2).

Undeniably, this unique baby-feeder suffered from various design deficiencies. Since it was made of clay, it was uncomfortable to drink from and concealed the amount of liquid consumed by the baby; moreover, it lacked a good seal and was unhygienic. Yet, its basic configuration has remained intact throughout the centuries since, contrary to the larger storage vessels, it was common in every household, cheap and relatively lightweight, thus easy to grasp. It could hold sufficient amounts of liquid appropriate for a baby's meal, and could be stoppered, while additional, softer pseudo-spouts made of cloth could improve its appeal to a delicate baby's mouth. Although hygienic and ergonomic attributes were not taken into consideration, its basic functionality obliterated the need to design specially constructed feeding bottles.

Elaborating on the four players of Wendy Griswold's (1994) 'cultural diamond' – the object, the user, the manufacturer and the socio-cultural environment – we can understand the lack of design effort as it pertains to the feeding bottle, as well as its rarity until the nineteenth century. On the one hand, the bottle's primary user was yet to be considered worthy of specially crafted objects, due to children's high mortality rate, which gained national concern only in modern era (Stone 1977; Trumbach 1978). The primary client was, therefore, not the baby, but the caregiver. As we shall see, the focus on the baby as the primary client will unfold during the twentieth century. Furthermore, the socio-economic

identity of the secondary user played an important part in the scarcity of the bottle, since the only populations who could afford material objects were the upper classes, who preferred to hire a wet-nurse (Etienne 1973; Fildes 1988). The fact that the majority of potential bottle users were members of the lower classes; that is, 'users' rather than 'consumers', explains the lack of an array of bottles before the modern era: lacking specially attributed funds, they preferred investing their meagre resources elsewhere. The nature of the users influenced the second component of the cultural diamond as well – the manufacturer. Based on the postulation that supply depends on demand, the lack of a proper clientele did not produce specialized manufacturers, but it was rather the caregiver, adopting the *quid pro quo design*, who appropriated existing objects and modified them accordingly.

The maternal versus the material: the birth of the modern feeding bottle

The negligible demand for feeding bottles sustained in France during the second half of the eighteenth century, when Enlightenment philosophy infused Europe with the understanding that children are different from adults and, therefore, require special care (Morel 1976; Sussman 1982). As a result, the common use of wet-nurses was rejected, and mothers of all classes resumed nursing their own children from the very first moments after birth (Robertson 1974; Duncan 1982; Fildes 1988). This new attitude towards infancy and motherhood, which continued at the beginning of the nineteenth century, is clearly manifested in the meagre design efforts concerning the feeding bottle, which included four main forms. Some, such as Mr Smith's clay bottles, resembled the Quimper teapot bottle depicted by Gauguin (Figures 1 and 2), featuring the same disadvantages: an inability to control the amount of liquid passing into the baby's mouth; an opaqueness preventing caregivers from monitoring the amount of liquid left in the bottle; and difficulty cleaning the bottle. The same disadvantages plagued the second type, a hybrid between a cup and a teapot (see Figure 5, object 10), as well as the third type, the pap boat (see Figure 5, objects 11–13). Indeed, the shift from objects 10 to 13 is a great example of design evolution, as the design serves in a better way its intended primary and secondary users. Evidently, even the most advanced example (object 13) still lacks a more convenient configuration, enabling the caregiver to pour the milk into the baby's mouth without risking spillage. The fourth type, the closest in shape to a premeditated feeding bottle, was a horizontal glass bottle, featuring a central hole for pouring liquids into it and a spout used to feed the baby. Yet, even the fourth type, like its predecessors, promoted an un-modulated swallowing of milk instead of gradual sucking perceived by doctors to be essential for healthy digestion.

However, during the 1820s, the baby-feeder market changed, following the fall from grace of maternal breast-feeding in favour of wet-nursing, preferred by

middle- and upper-class women, as well as by working women belonging to the urban working class (Fay-Sallois 1980; Sussman 1982; Fildes 1986). At the same time, a third, low-cost option – which also influenced the feeding bottle market – gained popularity, and remained common throughout the nineteenth century: 'dry-nursing' (*nourrices sèches*) – hiring a live-in nursemaid to bottle-feed the child.

While feeding bottles offered financial advantages to the secondary users – namely the parents – the extensive socio-historical changes in the attitude towards children proclaimed the birth of the primary user – the baby. The newly identified importance of early infancy led to the rise of novel professional manufacturers from the medical disciplines, aiming to supply the demand for improved feeding bottles that appeal to both users – parents and children alike. They, in turn, implemented new technological and material innovations, culminating in a new feeding bottle design, ensuring lengthier use and added safety for the baby.

These changes raise new questions: how did these modifications bring forth the newly designed bottle, while maternal breast-feeding was still considered better for the baby? What were the socio-cultural reasons for doctors to invest so much effort in designing superior bottles? Was this the result of economic demand and market structures, or of other considerations? Did these changes reflect the parents' will and their concern for the baby's wellbeing, or that of the medical establishment?

These questions are reinforced when taking into consideration the medical establishment's ambivalent attitude towards the feeding bottle. In the first quarter of the nineteenth century, doctors, such as Verdier-Heurtin, glorified maternal breast-feeding and avidly resisted the use of wet-nurses (1804, 1–17). Since, during these years, the use of feeding bottles was relatively rare in comparison with wet-nursing, bottles were seldom mentioned in maternal manuals, and even enjoyed a positive status *via-à-vis* the alternative, according to the principle of 'the enemy of my enemy is my friend'. This can explain why the old-style Quimper bottle was still in use. Its numerous disadvantages combined with its regional vernacular design, was hardly perceived as a threat in the eyes of doctors, who preferred dealing with the common use of Breton wet-nurses (Fay-Sallois 1980; Fildes 1986), rather than deal with the Brittonic feeding bottle.

Nonetheless, the manuals written from the 1880s to the early twentieth century substituted the old rivalry between mothers and wet-nurses with a new dispute between the mother and the feeding bottle (Variot 1908, 11–21, 40–55; Fay-Sallois 1980; Sussman 1982; Yalom 1998). During these years, the negative attitude of doctors towards the bottle contradicted their involvement in its manufacturing and marketing. The gap between words and deeds, contributing to the decrease in maternal breast-feeding in favour of the feeding bottle, stems from a combination of economic and technological factors enabling the manufacturers to design a product according to the consumers' needs and demands.

The first stage, in which doctors emphasized the advantages of the bottle over its main rival – the wet-nurse – is manifested in Jérôme Lasserre's book *Manual for the Father of the Family, or New Methods of Artificial Feeding*, published in Paris in 1822. Albeit denouncing the use of wet-nurses (39–40), he also mentions several disadvantages of bottles, such as a problematic choice of materials (metal or ceramics) that are difficult to clean or track the amount of milk in the bottle, the use of cow udders as nipples which emits bad odours, or their problematic size *vis-a-vis* the baby's mouth (15–17). In contrast, the good bottle enables the caregiver to regulate the amount of milk given to the baby, while taking into account the baby's age, development and strength of suction. The best bottle, designed by Lasserre himself, is described at length (six pages), enumerating its advantages and the correlation between design and healthfulness. Enabling a horizontal grip; containing an amount of milk sufficient for a six-month-old's full meal; made of thick, easy-to-clean glass with an additional glass tube that provides a steady flow of milk and prevents spillage; and a soft nipple made of a thin sponge covered with muslin, resembling a human nipple in size and shape (18–24). 'In order to treat this device properly', writes Lasserre, 'we must study and imitate nature' (25).

A similar reliance on nature was adopted by Parisian midwife Mme Breton, who managed in the early 1820s to successfully sell her innovative soft nipples, manufactured from cow udders soaked in water in order to resemble the maternal breast. Following commercial success, Breton started designing bottles that enjoyed unexpected success in France and in neighbouring countries (Figure 6). In order to promote her new invention, in 1826, she published a manual dedicated to 'artificial breast-feeding' (*allaitement artificiel*), describing her products and listing their prices (Breton 1826, title page). These include a regular bottle (7.50 francs) or reinforced bottles (8 francs), as well as colourful designed bottles (9–11 francs each) and ivory (9 francs) or wooden (5 francs) nipple cups. Regarding the cost of the products, we have to keep in mind that the annual income of blue-collar workers was 580 francs in 1831 and 800 francs in 1861 (Morrison and Snyder 2000). Therefore, the cost of a designed bottle was roughly equivalent to a worker's weekly salary. We can, therefore, understand the importance of Breton's investment in brand value and in securing the loyalty of her clients.

In her catalogue, Breton's signature is paramount, stressing the necessary vigilance for counterfeits of her products and the need to alert the authorities of the culprit (1826, title page). This later addition attests to the phenomenal success of Breton's products throughout France and England. In 1827, her bottles were acknowledged by the public following her winning of the bronze medal in the *Exposition des produits de l'industrie française,* held at the Louvre (Blanqui 1827, 329).

Yet, Breton's financial success produced less favourable critiques, manifested in an ever-growing competition for parents' resources. In 1833, a survey conducted by the *Académie royale de médecine*, questioned the quality of Breton's

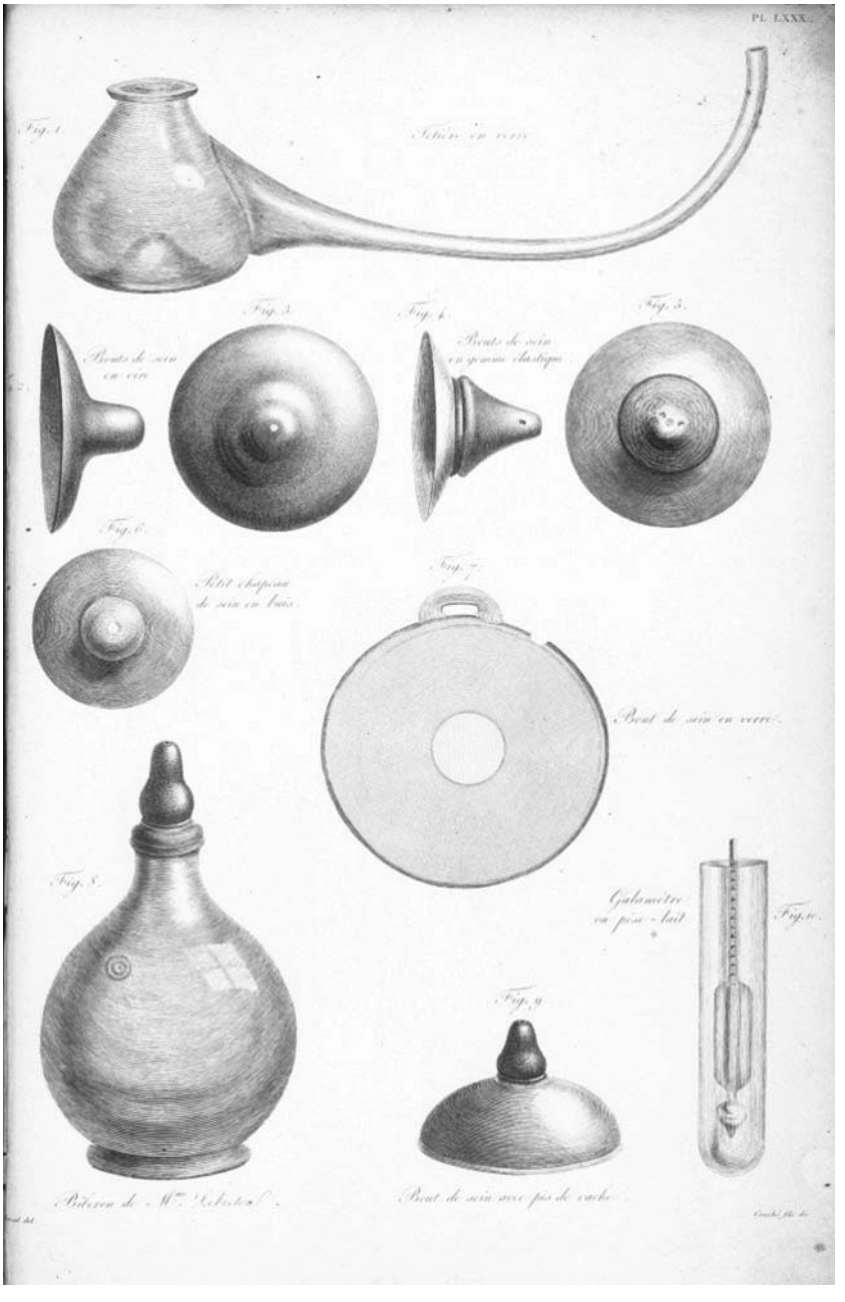

Figure 6. Mme. Breton's Feeding Bottle, Breast Pump and Teats, in Jacques Pierre Maygrier (MD), *Nouvelles démonstrations d'accouchements,* Béchet, Paris, 1822, Pl. LXXX. © Bibliothèque nationale de France.

over-priced products, while recommending cheaper, superior and durable products (Deneux 1883, 20–30, 55–68). Although on 13 April 1835, Breton received a letter from the Ministry of Commerce and Industry approving the use of her nipples and deeming them suitable for babies, as cited by Robert Labey (1994, 59),

she soon lost her grip over the market. Whether the result of her high prices or of the medical establishment's disapproval of her products, other manufacturers took hold of the market in the following years.

Yet, the ever-growing competition among feeding-bottle producers in the second half of the nineteenth century, benefiting secondary users with lower prices, was not to the liking of the medical establishment. While feeding bottles were scarcely mentioned in medical literature in the first third of the century, in the second half of the century, gaining popularity and starting to threaten maternal breast-feeding, doctors, such as the renowned paediatric Alfred Donné, began to highlight its downfalls with regards to the primary user – the baby (1842, 135–144). This attitude persisted throughout the 1860s, a decade in which concern for children's high mortality rate grew stronger. In 1866, a group of Parisian physicians established the *Société Protectrice de l'Enfance*, a philanthropic Society for the Protection of Children, by emphasizing the indispensability of maternal breast-feeding and the risks involved in its avoidance (Monot 1867, 86–89; Monot 1872, 23–63; Zeeger 1984; Sussman 1982). This approach remained prominent in late nineteenth-century medical writings, emphasizing the dangerous consequences of bottle-feeding (Talbert 1888).

However, in the last quarter of the nineteenth century, various doctors started calling for mixed feeding, or in other words, combining breast-feeding with bottle-feeding, while going to considerable lengths to design new bottles, which they perceived as an indispensable auxiliary to maternal breast-feeding (Caron 1873; Deligny 1882; Jousset 1885; Marfan 1896). This attitude continued through the last decades of the nineteenth century, as clearly manifested in an 1885 article titled: 'Long Live Bottle-Feeding!' ('Vive le biberon!'), in which Dr Caradec argues that it is 'a safe substitute method for breast-feeding' (33).

This shift towards the bottle originated with three main changes that took place at the end of the century: scientific, technological and economic. These, in turn, contributed to the fulfilment of two major needs: hygiene and comfort, for both the baby and the parents. The most important scientific discovery influencing the use of the bottle was Louis Pasteur's process of pasteurization, developed in 1864 and meant to eradicate bacteria from liquids. During the 1870s, these processes were applied to the pasteurization of milk, yielding a product with a longer shelf life, which could be safely transported across the country (Potter and Hotchkiss 1995; Robbins 2001).

Indeed, while popular approaches highlight the importance of Pasteur, in periodicals of his period he is not prominent. As Latour (1988) mentions in his book *The Pasteurization of France*, the general attitude regarded hygiene more as a style, rather than a scientific issue. Indeed, hygienists of the period responded erratically in what Latour terms 'morbid spontaneit'. Yet, after Pasteur's discoveries reduced the anxiety over the lives of those infants nourished with animal milk, dry-nursing was reinstated and became common practice from the 1890s onward. Though the majority of doctors still favoured maternal

breast-feeding, they claimed that feeding from a sterile bottle administered at the child's home is by far preferable to sending it far away to a wet-nurse (Brochard 1881, 11–12; Variot 1908, 11–35; Fay-Sallois 1980; Sussman 1982). Pasteur's discoveries gave rise to an increased awareness of the importance of hygiene, promoting the production of an ever-growing number of sterilizing products for bottles and nipples (see, for example, Rainal 1905, 305–306, 309, 366; Robert 1910, 24–26). In the 1889 World's Fair, several pavilions were dedicated to children's hygiene in order to bolster the public's trust in artificial feeding (*Congrès International* 1890, 22–23). Finally, in 1890 the French medical association recommended feeding babies with pasteurized milk for their own safety (Rollet 1990).

At the same time, several technological innovations contributed to the rise of medicinal bottle manufacture in the century's last decades. First, after years in which cow udders dominated the market, a new material – rubber – created a stir. Used in Europe since the 1840s, mostly for waterproof fabrics and footwear, this material was adopted by the artificial nipple industry as early as the beginning of the nineteenth century. Indeed, until the middle of the century, consumers preferred cows' udders due to the rubber nipples' repulsive odour, thickness and black hue. However, the development of vulcanized rubber in 1845 yielded a significant change (Snodgrass 2005; Sussman 1982). The possibility of designing thin, supple, soft, durable, heat-tolerant, easy-to-clean and low-cost nipples was quickly adopted by the medical establishment, making it the leading material in nipple manufacture (Pariset 1852, 332, 334).

Aside from scientific and technological innovations, the third factor enabling the takeover of feeding bottles was economic. Using bottles was significantly cheaper than employing a rural wet-nurse and enabled parents to leave their babies at home (Fildes 1988, 233–234). Furthermore, their accessibility and low cost could serve to facilitate breast-feeding for mothers, as they could now combine breast-feeding with bottle-feeding. The influence of technology on gender was considerable, since the industrial-age family has become more atomized and urban than its historical predecessor has (Schwartz Cowan 1999). Indeed, as demonstrated through this article, the broader meaning of technology involved the people operating material products, as well as socio-cultural norms and constraints, such as gender and social status. Following this line of thought leads to interesting questions relating to the feminine world of baby-feeding, versus the alleged powerful influence of masculinity embodied in the medical institution (Rothschild 1999; Lerman, Oldenziel, and Mohun 2003). In this light, it may be possible to assert that the growing bottle industry was not necessarily a manifestation of suppression by the medical establishment, but rather a manifestation of a feminine outlook, related to the freedom of choice. Even though the ever-growing power of female consumers was perceived as an extension of their domestic roles as mothers and wives, this activity contributed, in fact, to their integration into the public sphere, granting them economic freedom, mobility

and growing emancipation (Bowlby 1985, 19–20; Tiersten 2001, 22–23). Indeed, the new feeding bottles provided women with an accessible, artificial alternative to nursing, which relieved them economically, emotionally and psychically, and allowed them to blend family life with the breach of the confines of the domestic sphere.

The rise of the white coat: hygiene and the obliterated body

The flourishing of the feeding-bottle market in the last quarter of the nineteenth century changed the demands of the users. While the previous generation of bottles was mainly valued for accessibility – namely an object, that is available and inexpensive, that can contain and serve liquids – in the competitive capitalist market of the last quarter of the nineteenth century, with an abundance of new brands, the users' demands changed significantly and were redefined.

As medicalization of motherhood developed, childcare and health professionals recommended the use of artificial formulas and cow's milk, considered safer for babies from the end of the nineteenth century. Therefore, more and more mothers were convinced that either their milk was insufficient nourishment for the baby or less safe than the new and technological substitutes. Interestingly, most global brands of the era, such as Nestle or Imperial Granum branded their formula as 'food', rather than 'liquid' (Golden 1996). This approach, which aimed to control and assimilate feeding instructions among mothers, has been closely guarded by medical professionals, enduring until the last decades of the twentieth century (Apple 1987).

The emphasis on comfort and hygiene is manifested in writings of doctors, such as the well-known Félix Variot, who researched contemporary bottles and highlighted their advantages and disadvantages (1908, 10–15). These recommendations, mirroring consumers' demand for maximum comfort and security, directly influenced the rise and fall of various brands, among them Breton's bottles, clearing the stage for star doctors. These doctors adorned their bottles with meaningful names, such as Dr Budin's *Galactophore* ('milk bearer', Figure 7) or Robert's *Le Nourricier* ('the male wet-nurse' 1910, 2), attesting to the bottle's efficiency and suggesting the emergence of the male replacement to nurses of the past. Indeed, this amended bottle depicts the technological advancement of its era, as well as a superfluous scientific and hygienic approach. Made of sturdy glass (enabling frequent cleaning), rubber nipple-like snout and readable numeric quantities on its side, all herald the coming of a new type of design.

The bottles produced by Edouard Robert, a Dijon-based industrialist who first started marketing his products in 1869 and opened a Paris-based factory in 1880, rapidly became one of the most popular brands of the end of the century (Julien 1996). His flagship product was the *Biberon Robert à soupape*, a bottle sporting a long rubber spout attached to a valve (*soupape*), used to release the air during suction. The new ingenious design of the bottle created a

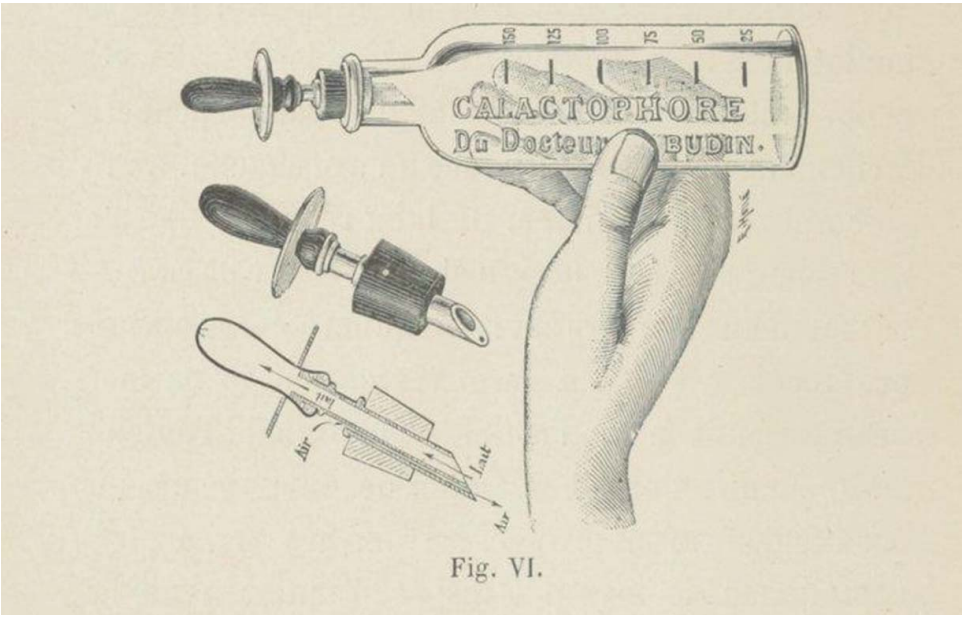

Figure 7. Dr Budin's feeding-bottle, in Antonin Bernard Jean Marfan (MD), *De l'allaitement artificiel*, G. Steinheil, Paris, 1896, p. 122, fig. vi. © Bibliothèque nationale de France.

multifaceted dialogue between the new technologies and its primary users (Oudshoorn and Pinch 2003) enabling babies to use it by themselves, as seen in various advertisements (see, for example, Figures 3 and 4). The Robert bottle (Figure 3) displays a considerable evolution of ergonomic considerations: standing safely on a sturdy bottom, equipped with a somewhat flexible tube, it enabled the baby to drink by himself. This may be one of the main reasons for its vast commercial success; as of the mid-1870s, three million Robert bottles were sold every year in Europe. Their low price – only 1 franc – in a period when a simple worker's daily wage was 3 francs, contributed to its retail triumph among members of all socio-economic strata (Labey 1994).

The bottle's success was undoubtedly also associated to its relentless marketing. Alongside advertisements accentuating the many medals won by the bottle in the 1870s, Robert created a bottle sporting the caption 'Robert 1873', referring to the honorary medal the bottle won during that year's World's Fair (Dolivet 1873, 2). In 1875, he anonymously published a book urging mothers to pay attention to their choice of bottles. Surveying the array of contemporary bottles, Robert highlights their flaws, which include discomfort (regulation and spillage of milk) and health hazards (the use of pewter or lead, damaging the milk), and strongly recommends using the 'Biberon Robert' (Morel 1999). The fourth chapter of the book, illustrated with Robert's long rubber snout bottle, deals with Robert bottles' materials and design, addressing the needs of both primary and secondary users. It is made of clear glass, enabling caregivers to clean it while also monitoring its contents. It holds 200 cc of liquid – enough for a mature

baby's full meal – into which a rubber tube is inserted and attached to a soft rubber nipple, enabling a steady flow of milk while preventing spillage (Robert 1910, 12–14). Robert concludes with a drawing of a baby sitting and drinking by himself from a bottle, stressing that 'Mr Robert resolved the severe problem of artificial feeding through his ingenious invention of the supple valve; he thus ranks among the inventors who have most benefitted humanity' (1910, 15).

However, in the late 1890s, after a decade of basking in the warm embrace of the medical establishment, the *biberon à long tuyau* received harsh reviews from the Academy of Medicine. In 1897, Dr Léon Dufour wrote: 'tolerating it means promoting infanticide' (10), recommending that parents purchase bottles without a rubber tube. Indeed, although Robert's bottles were comfortable and innovative, they lacked a major feature of the modern bottle – hygiene. The complexity involved in cleaning the long rubber tube, as well as its length, turned it into a bacteria factory, earning the unflattering nickname 'the baby killer'. On 6 April 1910, the *biberon à tuyau* was outlawed (Labey 1994), clearing the stage for its successor – the tubeless glass bottle, which resembles contemporary bottles (Fildes 1986; Sussman 1982) (see, for example, Figures 4 and 7). The tubeless bottle was not only safer to use, but technologically advanced and compatible with rising medical standards.

The predominance of technology in the bottle industry, which adopted the values of nature in the production of an artificial product, earned the full support of the medical discourse, which controlled the practice of feeding babies under the auspices of a new discipline: 'Puériculture' (the care of newborns). In the framework of this new discipline, senior doctors recommended new scientific ways of feeding babies, including methodical charts describing the exact amount the baby needs while taking into account its age and weight (Marfan 1896, 124–134; Variot 1908, 24–35, 40–55). Quantifying milk and adding exact measurements to the bottle (see, for example, Figures 4 and 7) redefined 'normalcy' in precise mathematical terms. Thus, a new standardization of hunger and satiety emerged, annulling the dependency on natural differences stemming from gender, socio-economic status and heredity, while discrediting motherly abilities to assess their infants' wellbeing.

This change supposedly improved babies' health; yet, the evolution of the modern feeding bottle transformed sterilization and hygiene into a way of life, replacing, to a certain degree, human warmth with mechanical thermometers. This trend, illustrated by the solitude of the infants in Dr Rougeot's and Robert's advertisements (Figures 3 and 4), was acutely manifested by the bottle with the long tube, which rendered the secondary user unnecessary, and for the first time enabled the baby to feed without a caregiver. Furthermore, the new bottle also created distance between the baby and its own body, which was not only influenced by social norms and conventions, but rather defined and controlled by them (Foucault 1974; Shilling 1993).

The root of the body's sterilization is apparent in the early 1820s, when Mme Breton's new rounded bottles, titled 'sein artificiel' (artificial breasts, Figure 6), were allegedly imitating the female breast, under technological constraints of the period, while actually materializing a conversion of the natural into the artificial. This trend further degenerated with the substitution of the cow's udder with vulcanized rubber nipples, presenting sterilization *for* the body, while in fact sterilizing *the* body itself. This trend is apparent in nineteenth-century medical literature, calling upon women and suggesting, under scientific guise, to reduce their direct bodily contact with the baby, culminating in the recommendation of mixed feeding that gradually eradicated breast-feeding altogether. While Breton recommended that parents use bottles according to the baby's needs (1826, 14–15), the doctors at the end of the century inscribed charts on their designed bottles, depicting exact quantities and measurements. Instead of relying on the baby's behaviour (crying, bowel movements, sleep and mood), as suggested by Breton (1826, 20–21), the new narrative accentuated measurable parameters (weight, height, liquid quantities) to track the baby's growth and wellbeing (see, for example, Variot 1914, 6–7). Instead of focusing on the baby, parents now determined whether or not it was feeling well according to the doctor's declaration, rather than deciphering it by themselves. These changes have influenced our perception of the body, which embedded social norms manifested through everyday bodily functions and experiences (Bourdieu 1977; Douglas 2003). Thus, the individual body, viewed as a reflection of the self, comprising both body and soul, turned into the social body, which in the medical context, created a differing relationship between the private body and its social sphere.

Conclusions

This might explain the prolonged life of the Breton bottle depicted by Gauguin, despite its numerous disadvantages (Figures 1 and 2). Unlike its modern, sophisticated competitors, the Quimper vernacular naïve design, aesthetically appealing to Parisian painters, maintained a clear difference between the artificial and the natural, while conserving human contact between the baby and his caregivers. Indeed, postcards of Breton women feeding babies with the Quimper bottle were popular at the end of the nineteenth century, offering a nostalgic reminiscence of life in the past. While 'the only rational strategy that remains open to ordinary citizens is that of suspicion', as claimed by Callon, Lascoumes, and Barthe (2001), regarding new technological inventions, the familiar, traditional object caused no disapproval. In contrast, at the end of the nineteenth century, the medical attempts to imitate nature turned into extensive efforts to surpass it. The private and the public; the personal and the social bodies, merged into the political body, while subjected to power and medical control (Lock 1993). This agenda is epitomized in the design of the bottle, shedding of human touch for the sterilization of the body and family relations, replacing nature with science.

As is the case in all designed objects, the end-of-the-century feeding bottle was a result of an array of players, socio-cultural as well as economic and technological factors. As babies took their place as primary clients, numerous products were specifically crafted, designed and marketed to suit their preferences and needs. While caregivers remain influential, their role was carefully influenced by public and medical opinion towards health, safety and the integration of new technologies. As a result, as western society became ever more medicalized, heralding an age of hygiene and careful monitoring of every aspect of our lives, the role of the designer changed as well. While in its primary days, the bottle's design was ruled by members of the health institutions, during the twentieth century their role lost its visuality and appearance, albeit maintaining their prominence. In a somewhat Foucauldian manner, the healthcare professionals' influence has become embedded in the very design of contemporary feeding bottles. Through the choice of technology, manufacture, shapes and colours, health professionals' influence never abated, it has just become harder to see. Unlike its predecessors, the design of the feeding bottle in contemporary consumer culture turned into a lifestyle product, characterized by its colour scheme and innovative shapes, materials, textures and configurations. In a world such as this, ironically, also doctors are gradually becoming an inherent, although transparent, part of designed objects.

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References

Appadurai, Arjun. 1986. "Introduction: Commodities and the Politics of Value." In *The Social Life of Things: Commodities in Cultural Perspective*, edited by Appadurai Arjun, 3–63. Cambridge: Cambridge University Press.

Apple, Rima D. 1987. *Mothers and Medicine: A Social History of Infant Feeding, 1890–1950*. Madison, WI: The University of Wisconsin Press.

Bijker, Wiebe E. 1995. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. Cambridge, MA: The MIT Press.

Blanqui, A. 1827. *Histoire de l'Exposition des produits de l'industrie française en 1827*. Paris: Dietz fils.

Bourdieu, Pierre. 1977. *Outline of a Theory of Practice*. Cambridge: Cambridge University.

Bowlby, Rachel. 1985. *Just Looking: Consumer Culture in Dreiser, Gissing and Zola*. New York: Methuen.

Breton, M. 1826. *Avis aux mères qui ne peuvent pas nourrir, ou instruction pratique sur l'allaitement artificiel*. Paris: Chez l'auteur.

Brochard, T. 1881. "Correspondance: Du servage du biberon." *La Jeune mère ou L'éducation de Premier âge* 8: 10–12.

Caradec, M. 1885. "Causerie du docteur: Vive le biberon!." *La Jeune mère ou L'éducation de Premier âge* 12: 33.

Callon, Michel, Pierre Lascoumes, and Yasnnick Barthe. 2001. *Acting in an Uncertain World: An Essay on Technical Democracy*. Cambridge, MA: The MIT Press.

Cariou, André. 2003. *L'aventure de Pont-Aven et Gauguin*. Paris: Musée du Luxembourg.

Caron, Alfred-Charles. 1873. *Guide Pratique de L'alimentation Hygiénique et Physiologique au Sein ou au Biberon*. Paris: G. Baillière.

Congrès International d'hygiène et de démographie à Paris en 1889. 1890. Paris: Imprimerie de E. Monnoyer.

Conrad, Peter. 2007. *The Medicalization of Society: On the Transformation of Human Conditions into Treatable Disorders*. Baltimore, MD: Johns Hopkins University Press.

Deligny, L. 1882. Le Biberon: Conseils aux méres. Paris: Asselin & Cie.

Deneux, G. 1883. *Mémoire sur les bouts de seins, ou mamelons artificiels et les biberons*. Paris: Just-Rouvier.

Dolivet, Charles. 1873. *Journal officiel: programme de l'Exposition universelle et internationale de tout ce qui a rapport à l'enfant, depuis son enfance jusqu'à son adolescence, au Palais de l'industrie* 4. Paris.

Donné, Alfred, MD. 1842. *Conseils aux mères sur la manière d'élever les enfants nouveaux-nés, ou de l'éducation physique des enfants du premier âge*. Paris: J. B. Baillière et fils.

Douglas, Mary. 2003. *Natural Symbols: Explorations in Cosmology*. London: Routledge.

Dufour, Léon. 1897. *Le Biberon à travers les âges dans le pays de Caux*. Rouen: Emile Deshays et Cie.

Duncan, Carol. 1982. "Happy Mothers and Other New Ideas in Eighteenth-Century French Art." In *Feminism and Art History: Questioning the Litany*, edited by Broude, Nancy and Mary D. Garrard, 201–220. New York: Harper & Row.

Etienne, Robert. 1973. "La conscience médicale antique et la vie des enfants [The Antique Medical Consciousness of Children's Lives]. In *Annales de démographie historique*, Vol. 1973: 15–61. Persée-Portail des revues scientifiques en SHS.

Fay-Sallois, Fanny. 1980. *Les Nourrices à Paris au XIXe Siècle* [The Wet-Nurses in Paris in the 19th Century]. Paris: Payot.

Fildes, Valerie A. 1986. *Breasts, Bottles and Babies – a History of Infant Feeding*. Edinburgh: Edinburgh University Press.

Fildes, Valerie A. 1988. *Wet-Nursing: A History from Antiquity to the Present*. Oxford: Basil Blackwell.
Foucault, Michel. 1974. *The Archaeology of Knowledge*. London: Routledge.
Golden, Janet. 1996. *A Social History of Wet Nursing in America: From Breast to Bottle*. Cambridge: Cambridge University Press.
Griswold, Wendy. 1994. *Cultures and Societies in a Changing World*. Thousand Oaks CA: Pine Forge Press.
Julien, Pierre. 1996. "Nouveaux documents sur le biberon Robert" [New Documentation on the Robert Baby Bottle]. *Revue d'histoire de la Pharmacie* 84: 25–38.
Julier, Guy. 2007. *The Culture of Design*. London: Sage.
Jousset, Alfred. 1885. *Le Biberon, ses indications, ses variétés, son rôle dans l'alimentation et la médication infantile*. Lille: Journal des Sciences Médicales.
Labey, Robert. 1994. Christophe Colomb: Le Caoutchouc et les Tétines [Christopher Columbus, Rubber and Pacifiers]. *Revue d'histoire de la Pharmacie* 82 (300): 55–63.
Lasserre, Jérôme. 1822. *Manuel du père de famille, ou Nouvelles méthodes de l'allaitement artificiel, et de faire prendre aux enfants, et même aux adultes, les liquides dans certains cas*. Paris: Prosper Noubel Imprimeur Libraire.
Latour, Bruno. 1988. *The Pasteurization of France*. Cambridge MA: Harvard University Press.
Lerman, Nina, Ruth Oldenziel, and Arwen P. Mohun. 2003. "Introduction: Interrogating Boundaries." In *Gender and Technology: A Reader*, edited by Lerman, Nina, Ruth Oldenziel, and Arwen P. Mohun, 1–12. Baltimore, MD: The John Hopkins University Press.
Lock, Margaret. 1993. "Cultivating the Body: Anthropology and Epistemologies of Bodily Practice and Knowledge." *Annual Review of Anthropology* 22: 133–135.
Marfan, Antonin B. J. 1896. *De l'allaitement artificiel*. Paris: G. Steinheil.
Martucci, Jessica. 2015. *Back to the Breast: Natural Motherhood and Breastfeeding in America*. Chicago, IL: The University of Chicago Press.
Matthews-Grieco, Sara, and Carlo A. Corsini. 1991. *Historical Perspectives on Breastfeeding*. Florence: UNICEF.
Monot, Charles. 1867. *De l'industrie des nourrices et de la mortalité des petits enfants*. Paris: Brochard.
Monot, Charles. 1872. *De la mortalité excessive des enfants pendant la première année de leur existence, ses causes et des moyens de la restreindre*. Paris: J. B. Baillière et fils.
Morel, Marie-France. 1976. "Théorie et pratique de l'allaitement en France au XVIIIe siècle" [Theory and Practice of Breastfeeding in France in the 18th Century]. *Annales de Démographie Historique* 1: 393–427.
Morel, Marie-France. 1999. "Le Tout-Petit, sa Mère et le Médecin: la Médicalisation de la Petite Enfance, xviii e–xx e siècles" [The Baby, the Mother and the Doctor: the Medicalisation of Early Childhood]. *Archives de Pédiatrie* 6: 444–447.
Morrison, Christian, and Wayne Snyder. 2000. "The Income Inequality of France in Historical Perspective." *European Review of Economic History* 4: 59–83.
Oudshoorn, Nancy, and Trevor Pinch. 2003. "Introduction: How Users and Non-Users Matter." In *How Users Matter: The Co-construction of Users and Technologies*, edited by Oudshoorn Nancy, and Trevor Pinch, 1–28. Cambridge, MA: The MIT Press.
Pariset, M. 1852. *Nouveau manuel complet de la maîtresse de maison, ou Lettres sur l'économie domestique*. Paris: Roret.
Petroski, Henry. 2010. *The Evolution of Useful Things*. London: Reaktion.
Potter, Norman N. and Joseph H. Hotchkiss. 1995. *Food Science*. New York: Chapman & Hall.
Rainal, M. 1905. *Catalogue Général*. Paris: Impr. Lahure.
Rice, Tom. 2010. "The Hallmark of a Doctor: The Stethoscope and the Making of Medical Identity." *Journal of Material Culture* 15 (3): 287–301.

Robbins, Louise E. 2001. *Louis Pasteur and the Hidden World of Microbes*. Oxford: Oxford University Press.
Robert, Edouard. 1910. *Catalogue des Biberons de Dr. Robert*. Paris: Bacholet.
Robertson, Priscilla. 1974. "Home as a Nest: Middle Class Childhood in Nineteenth-Century Europe." In *The History of Childhood*, edited by DeMause Lloyd. New York: Psychohistory Press.
Rollet, Catherine. 1990. *La Politique à L'égard de la Petite Enfance sous la Troisième République*. Paris: Hachette.
Rothschild, Joan. 1999. "Feminism and Design: Review Essay." In *Design and Feminism: Revisioning Spaces, Places, and Everyday Things*, edited by Rothschild Joan, 7–34. New Brunswick, NJ: Rutgers University Press.
Schwartz Cowan, Ruth. 1999. "The 'Industrial Revolution' in the Home: Household Technology and Social Change in the Twentieth Century." In *Material Culture Studies in America*, edited by Schlereth Thomas, 222–236. Lanham, MD: Altamira Press.
Senior, Nancy. 1983. "Aspects of Infant Feeding in Eighteenth-Century France." *Eighteenth-Century Studies* 16 (4): 367–388.
Shilling, Chris. 1993. *The Body and Social Theory*. London: Sage.
Snodgrass, Mary Ellen. 2005. *Encyclopedia of Kitchen History*. New York: Oxford University Press.
Stone, Lawrence. 1977. *The Family, Sex, and Marriage in England, 1500–1800*. London: Harper & Row.
Sussman, George D. 1982. *Selling Mothers' Milk: The Wet-Nursing Business in France, 1715–1914*. Urbana, IL: University of Illinois Press.
Talbert, E. 1888. "L'allaitement maternel obligatoire." *La Jeune mère ou l'éducation de premier âge* 15: 69–70.
Tiersten, Lisa. 2001. *Marianne in the Market: Envisioning Consumer Society in Fin-de-siècle France*. Berkeley, CA: University of California Press.
Trumbach, Randolph. 1978. *The Rise of the Egalitarian Family: Aristocratic Kinship and Domestic Relations in Eighteenth-Century England*. New York: Academic Press.
Variot, Gaston F. J. 1908. *L'Hygiène infantile, allaitement maternel et artificiel, sevrage*. Paris: Hachette.
Variot, Gaston F. J. 1914. *Instructions aux mères pour allaiter et nourrir leurs enfants*. Paris: Steinheil.
Verdier-Heurtin, F, MD. 1804. *Discours et essai aphoristiques sur l'allaitement et l'éducation physique des enfants*. Ballanche: Lyon.
Yalom, Marilyn. 1998. *A History of the Breast*. New York: Knopf.
Zeegers, Anne-Christine. 1984. *Allaitement Maternel: Aspects Sociologiques, Médicales et Psychologiques* [Maternal Breastfeeding: Sociological, Medical and Psychological Aspects]. MD dissertation. Paris: Université de Paris Val de Marne.